Mobilization of tax revenues in Africa

State of play and policy options

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SUMMARY

Sub-Saharan Africa faces a sizeable shortfall in financing for investment, estimated at about $230 billion a year, on average, over the next five years. This shortfall is due to low domestic savings rates, partly as tax revenue collection continues to underperform notwithstanding recent improvements. Indeed, tax revenues in the region (excluding those raised from the natural resource sector) moved up from 11 percent of GDP in the early 2000s to about 15 percent in 2015. Even so, the ratio falls short of the desired level and remains below that of the OECD (24 percent) and other emerging and developing countries. In this brief, we develop an analytical framework to guide our understanding of the factors still restraining the region's revenue collection and to discern the fundamental drivers of the increase in past years.

We find that the region's still-lower tax revenues are due to both lower taxation capacities—about 20 percent of GDP on average—and to inefficiencies in revenue collection. Addressing both factors can significantly boost revenues in sub-Saharan Africa to levels comparable to those of OECD countries. Encouragingly, both tax capacity and efficiency in revenue mobilization are increasing region-wide, contributing to the 4 percentage point increase in tax-to-GDP ratio over the past two decades or so.

Looking ahead, scope exists to raise tax revenues above the current levels by further strengthening tax capacity and improving governance in revenue collection. On the one hand, strengthening tax capacity should remain a medium- to long-term policy objective, given that capacity is largely determined by entrenched structural factors such as the stage of economic development, the size of the informal sector, sectoral composition of economic activity, and so on. Improving governance, on the other hand, can yield near-term results. Our analysis suggests that strengthening governance, including combating corruption and bolstering accountability, can significantly reduce inefficiencies, and help mobilize up to $110 billion annually, on average, over the next five years. This amount is more than double the $44 billion in official development assistance to the region in 2016, and almost one-half of the estimated $230 billion average financing gap.

THE CHALLENGE: BOOSTING TAX REVENUES TO HELP FUND THE LARGE DEVELOPMENT FINANCING NEEDS

Most sub-Saharan African countries suffer from perennially low domestic saving rates, which averaged just 15 percent of GDP last year—among the lowest in the world. These low saving rates fall significantly short of financing needs. Based on projections in the International Monetary Fund's April 2018 World Economic Outlook, the saving rates on the continent will average almost 18 percent of GDP over the next five years, while investment rates will average about 22 percent. These projections suggest an average external funding gap of 4 percent of GDP. In reality, the funding gap is wider because historical experience suggests that countries at this stage of economic development need investment rates close to 30 percent of GDP or higher over a sustained period to achieve economic transformation. At the desired investment rates, the average annual funding gap for the region rises to 12 percent of GDP or about $230 billion.

Filling this large void with external financing alone will entail substantial current account deficits and make economies prone to balance of payment crises and macroeconomic instability. This conundrum highlights the importance of boosting domestic resources, which hold the key to Africa's ability to sustainably finance its development agenda. Tax revenues are the most important component of domestic resources, and raising them has been at the center of many initiatives and commitments by African governments and their international development partners. Some of these initiatives include the 2002 Monterrey Consensus,[1] the 2011 Busan Agreement,[2] the Addis Tax Initiative launched in 2015,[3] and the Platform for Collaboration on Tax launched in 2016.[4]

With the outlook for external financing looking increasingly more difficult and with debt levels on the rise across the continent, the mobilization of domestic resources is imperative. In this context, it is an opportune time to assess the state of play and prospects for tax revenue collection.

TAX REVENUE MOBILIZATION IN AFRICA: THE STATE OF PLAY

As shown in Figure 1, Africa has made some progress in raising non-resource tax revenues over the past two decades. The ratio of tax revenues excluding natural resource taxes and social contributions rose steadily from roughly 11 percent in the early 2000s to around 15 percent in 2015.[5] Administrative and legislative reforms during the 1990s and 2000s have been important in improving revenue collection (Fossat and Bua, 2013; Kloeden, 2011). Reforms included the introduction of value-added tax in several countries, programs to improve taxpayer services, and the roll out of electronic filing systems (OECD, 2017). The creation of semi-autonomous revenue agencies in several countries also improved non-resource tax mobilization (Ebeke et al., 2016). Elsewhere, depending on domestic conditions, countries have removed tax exemptions, revised investment codes, and implemented tax reforms for small businesses (IMF, 2018b). Despite these efforts, the ratio of tax revenues to GDP remains low. At around 15 percent, sub-Saharan Africa has one of the lowest ratios in the world, significantly below the 24 percent average in OECD countries.

The regional aggregate masks significant heterogeneity in performance. As shown in Figure 2, for several economies, revenues are below 10 percent of GDP. Non-resource tax revenues are particularly low in resource-intensive economies, pointing to great scope for more revenue mobilization in the non-resource sectors of these economies. For example, in Chad, Equatorial Guinea, and Nigeria, revenues from non-resource sectors are only about 5 percent of GDP or less. The excess reliance on resource revenues exacerbates the effect of declines in commodity prices on these economies. In contrast, Lesotho, Namibia, South Africa, and Swaziland have all been more successful, with revenue collection comparable to or even exceeding the OECD average.
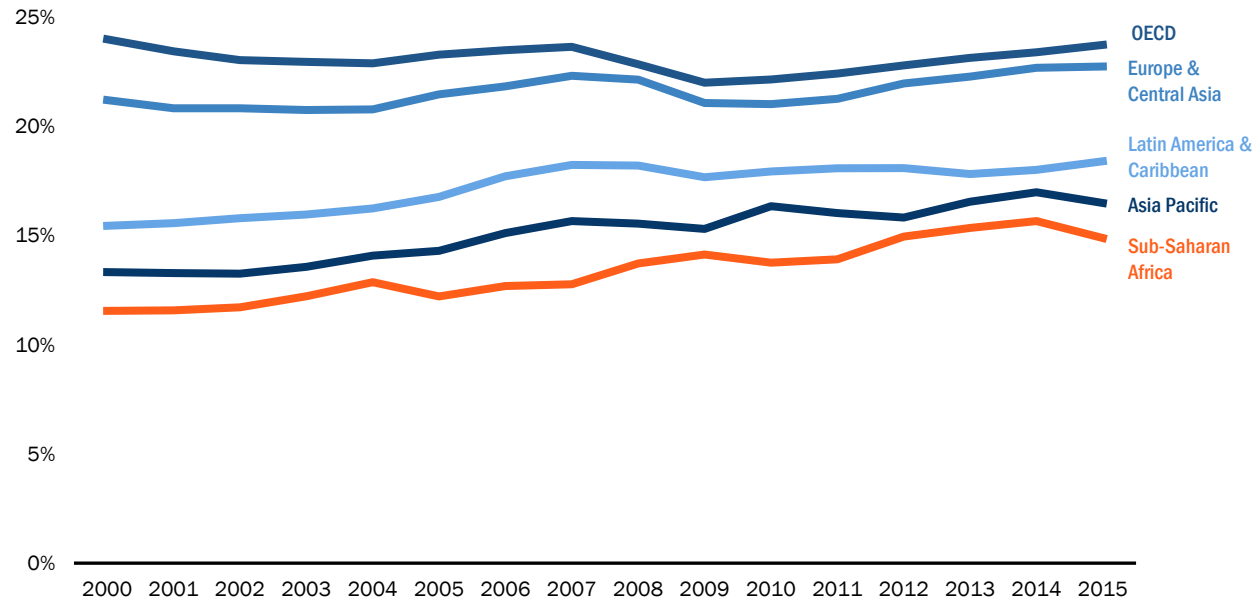
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1 http://www.un.org/esa/ffd/overview/monterrey-conference.html
2 http://www.oecd.org/development/effectiveness/busanpartnership.htm
3 https://www.addistaxinitiative.net
4 http://www.worldbank.org/en/programs/platform-for-tax-collaboration
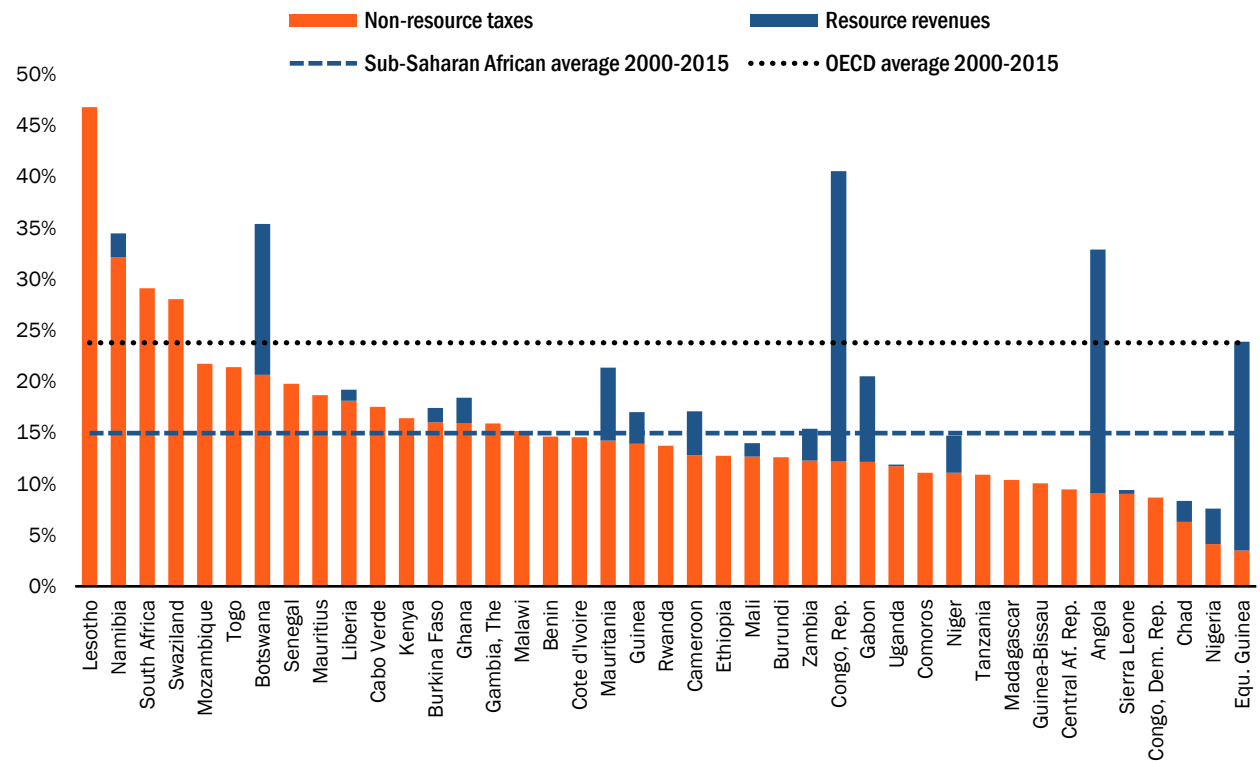5 Averages based on an unbalanced panel dataset. Sample differs from that used for the stochastic frontier analysis due to missing data for independent variables. A number of sub-Saharan African countries do not have tax revenue data for 2015.

Figure 1: Regional non-resource taxes 2000-2015 as percent of GDP[6]

Source: ICTD / UNU-WIDER Government Revenue Dataset, November 2017

Figure 2: Tax revenues as a percent of GDP, most recent year

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6 The Asia Pacific grouping includes countries in the East Asia & Pacific and South Asia regions in the World Bank regional classifications. OECD countries are also included in their respective regional groupings.

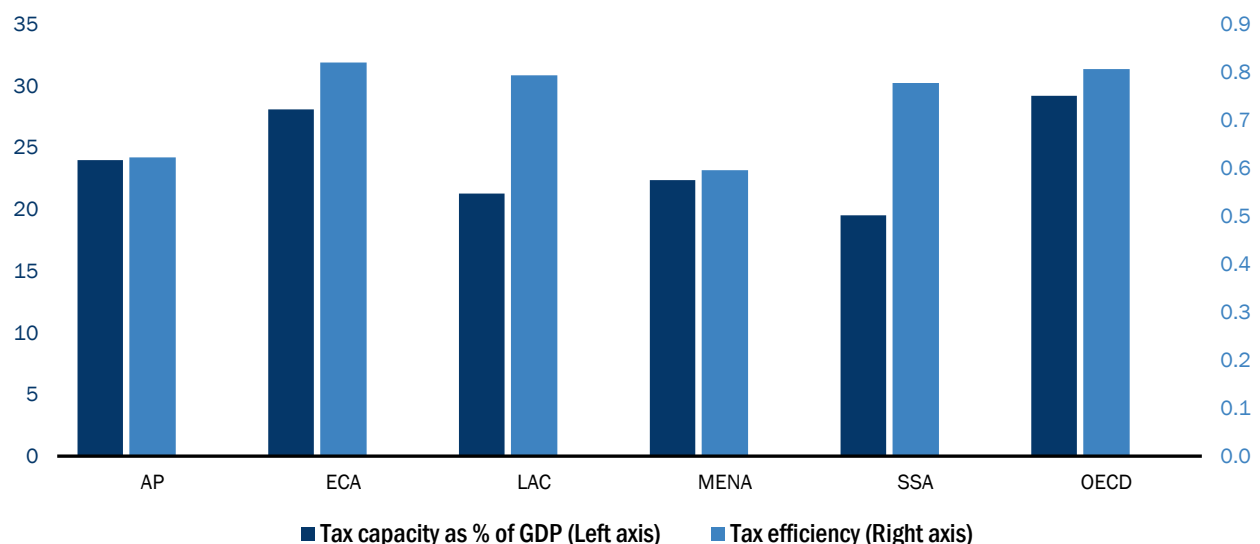# UNDERSTANDING AFRICA'S LOW TAX REVENUES: THE FRAMEWORK

The disparities in tax revenue mobilization across the continent and the large gap compared with, for example, the OECD countries could be due several factors including inadequate fiscal policy and low taxation capacity of the economies, leakages in revenue collection, weak enforcement, etc. Using a stochastic frontier econometric model as a guide, we study the two fundamental drivers of tax revenues mobilization in Africa over the past two decades: taxation capacity and efficiency in tax revenue mobilization. (See the technical appendix for model specification and the econometric results).

The tax capacity of a country defines the optimum tax revenues as percent of GDP that it can mobilize given the structural features of its economy. For example, differences in structural features of OECD countries and African countries can impose different levels of optimal tax revenues and help explain Africa's lower level of revenues. Besides tax capacity, inefficiency in revenue mobilization due to poor governance, leakages, or weak enforcement could cause revenues to fall short of countries' tax capacities. The estimated econometric model provides the framework to understand the lower level of tax revenue mobilization in Africa as well as the drivers of the increase in tax revenues over the past two decades or so. The framework also allows us to assess the scope for various policies to boost revenues to the desired levels.

Capacity of tax revenues

The results, shown in Figure 3 below, indicate that sub-Saharan African countries have a relatively low tax capacity at 20 percent of GDP, on average, the lowest in the world, and almost 10 percentage points below that of OECD countries. This is due primarily to the low level of economic development, the large share of agriculture in economic activity, the large size of the shadow or informal economy. The informal economy in the region accounts for 34 percent of GDP, on average, ranging from 19 percent for Mauritius to 52 percent for both Gabon and Nigeria.[7] These results suggest that the benchmark against which to measure revenues collection for most countries in Africa is not the 24 percent level of the OECD, but the 20 percent tax capacity level of these economies. Even with 20 percent of GDP as benchmark, tax revenues in Africa still fall short, leaving a 3.9-percentage point gap. Our analysis attributes this gap to inefficiencies in revenue collection.

Figure 3: Tax capacity and tax collection efficiency by region (most recent year)[8]

AP – Asia Pacific; ECA – Europe & Central Asia; LAC – Latin America & Caribbean; OECD – Organization for Economic Co-operation and Development countries; SSA – sub-Saharan Africa.
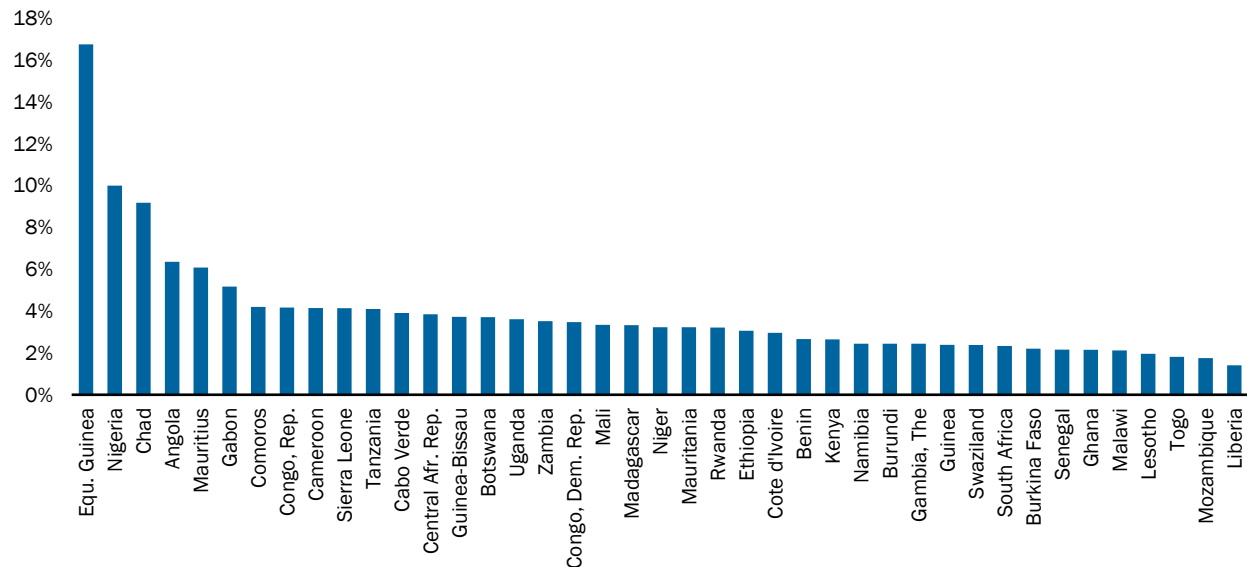
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7 See Medina and Schneider (2018) for a discussion on the size of the informal economies.
8 Most recent year regional averages are based on the latest available observation for each country in 2013 or later. OECD countries are also included in their respective regional groups.

Figure 4 displays the gaps between tax capacity and tax revenue collection by country. Significant heterogeneity in tax gaps exist across the region. At the country level, the gaps are largest for Equatorial Guinea, Nigeria, Chad (9 percentage points or higher) and smallest for Liberia, Mozambique, and Togo—2 percentage points or less.

In nominal GDP terms, the 4 percentage points in revenue gap amounts to about $80 billion in 2018 and, assuming the same revenue to GDP gaps over the next five years, the gap rises to $140 billion in 2023. Over the period, the gap averages $110 billion per year. Given the large size of its economy and its low tax efficiency, Nigeria tops the group with an estimated gap of $60 billion, about half of the region's gap.

Figure 4: Estimated tax revenue gaps for sub-Saharan African countries as a percent of GDP
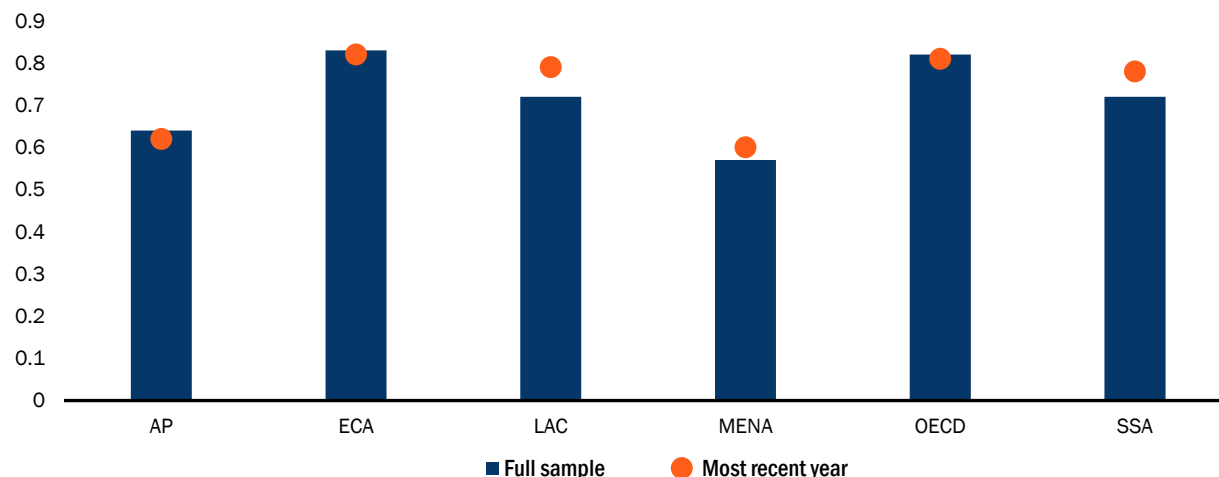

Efficiency in tax collection

Using the econometric framework, we estimate the level of efficiency (or effort) in tax collection. An efficiency score of "1" indicates the best performance while a score of "0" indicates the worst. The measured efficiency scores, the sample average and in the latest year, are shown in Figure 5. For Africa, the efficiency has risen to 0.78 compared with 0.81 for the OECD countries. One possible interpretation of these results is that Africa's tax collection efficiency is close to that of the OECD.
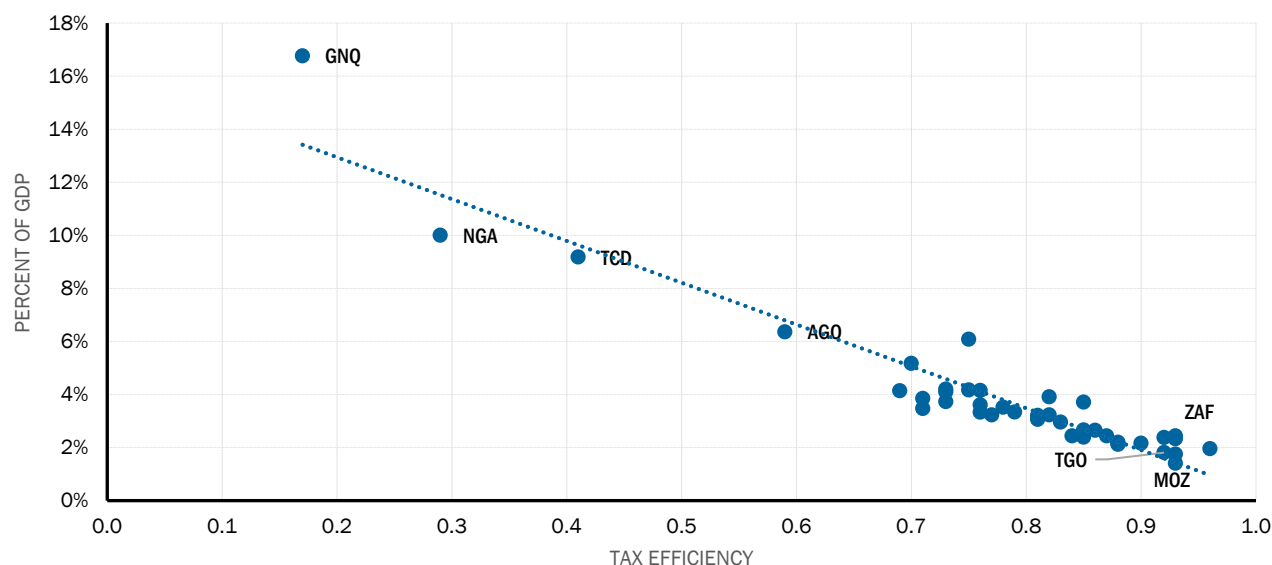
As a caveat, the level of effort estimated for some regions could be intentionally low as result of a public policy choice. For example, if governments budgetary needs do not justify higher level of revenue collection, the tax administrations could alleviate the taxation on economic agents by, for example, providing tax breaks. Our econometric framework does not allow a separation between efforts that are the result of a policy choice or efforts that reflect inefficiencies. However, for the developing countries such as those in Africa, it is reasonable to attribute lower levels of efforts to inefficiencies as opposed to policy options given the large financing needs of the governments. For these reasons as well as the governments' stated objectives to boost tax revenues, it is reasonable to expect the efficiency target for African (and other developing economies) economies to be closer to 1. If the region were to achieve this target, our model suggests that, tax revenues would rise by 3.9 percentage points.

Figure 5: Tax efficiency by region

As shown by the scatter plots in Figure 6, the gap is highly correlated (-0.94 correlation coefficient) with the level of efficiency. The countries with the highest efficiency scores have the narrowest gaps. The effort is particularly low and the gaps large for natural resource rich countries such as Equatorial Guinea, Nigeria, Chad, and Angola.

Figure 6: Tax gap vs tax effort sub-Saharan African countries (most recent year)

In a second stage of the econometric analysis, we assess the fundamental drivers of the low efficiency, and find that corruption and weak democratic accountably plays a significant role, given the negative relationship between the gaps, on the on hand, and corruption and accountability on the other.

Improvement in revenue collection: The role of capacity vs. efficiency

As indicated earlier, tax revenues have increased by about 4 percent of GDP since the early 2000s. Using the econometric framework, we assess the fundamental drivers of the increase. As shown in Figure 7, tax capacity increased from about 15 percent in early 2000s to roughly 20 percent in recent years. The region's strong economic growth over the past two decades has increased GDP per capita from around $3,500 to $5,400 in real terms and the share of the informal economy fell by 8 percentage points to 34 percent over the period, helping to expand the tax base. Several countries including Senegal, Tanzania, and Zambia have seen their informal economy shrink by more than 10 percentage points since 2000. Similarly, efficiency in tax revenue

collection increased, with average efficiency moving up from 0.72 in early 2000s to 0.78 at the end of the sample period, as governance improved.

Simulations using the econometric results indicate that the improvements in tax capacity and efficiency in tax collection contributed almost equally, about 2 percentage points, to the increase in the higher tax revenues observed over the sample period.[9]

At the country level (Table 1), Mozambique, Swaziland, and Togo experienced the highest increases in tax revenues between 2000 and 2015 (over 10 percentage points), as tax capacity rose significantly and tax collection efficiency improved. In 2015, tax collection efficiency in all three countries rose above 0.90. In the bottom five performers, every country except Chad experienced a decline in tax revenues. In Burundi, Madagascar, and Zambia, the decline in revenues owed to declines in both effort and tax capacity. For Nigeria and Chad, tax capacity rose a bit, but these increases were largely offset by declines in tax collection efficiency.

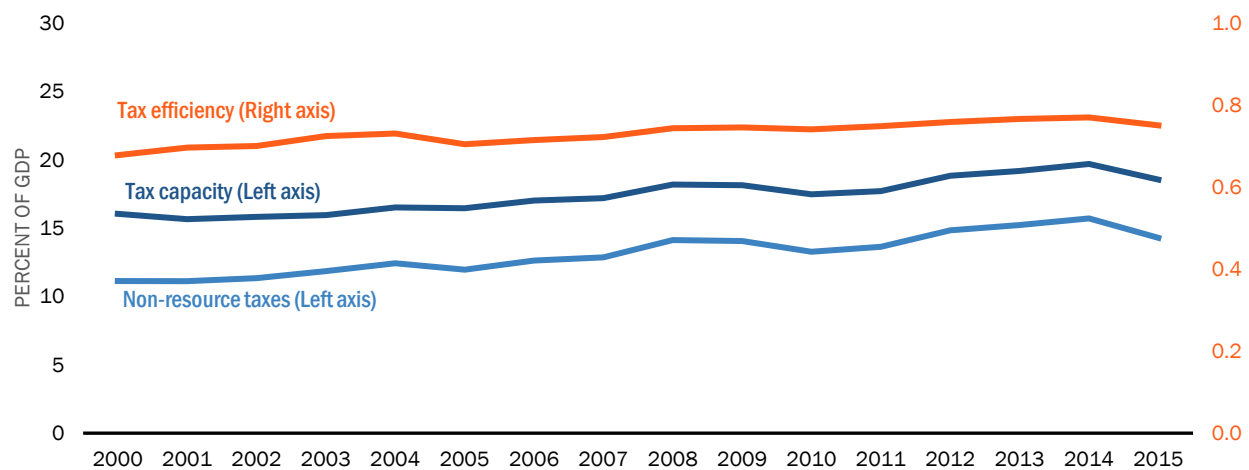## Figure 7: Tax revenue, tax capacity, and efficiency in sub-Saharan Africa[10]

Table 1: Top & bottom 5 performers in tax-to-GDP ratio, 2000-2015

Country	Change in tax/GDP (% of GDP)	Change in Tax effort	Change in Tax Capacity (% of GDP)
Top 5			
Mozambique	12.4	0.21	10.4
Swaziland	10.5	0.10	9.0
Togo	10.2	0.20	7.8
Namibia (2014)	9.5	0.05	8.8
Botswana (2014)	8.0	0.20	4.9
Bottom 5			
Zambia	-2.7	-0.10	-1.4
Burundi (2014)	-2.3	-0.06	-1.7
Madagascar	-0.9	-0.01	-1.1
Nigeria	-0.3	-0.06	1.58
Chad	0.2	-0.06	2.4

9 Similar to the decomposition analysis by Langford and Ohlenburg (2016), we hold tax effort constant at 2000 levels when calculating the impact of the increase in tax capacity on revenues.
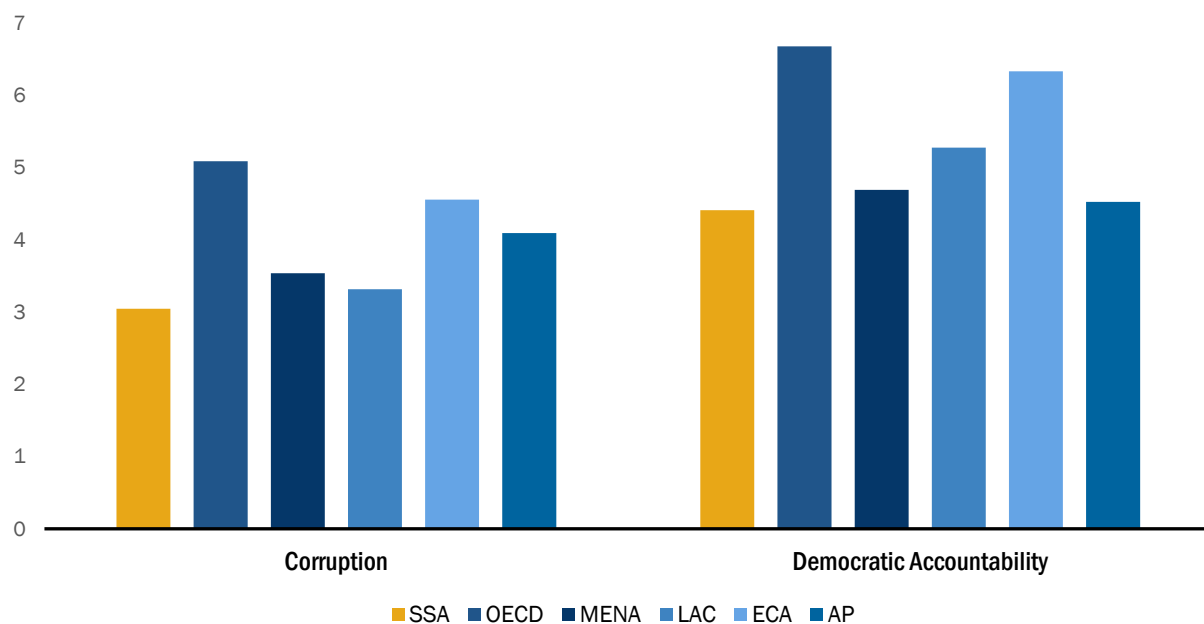10 Averages based on an unbalanced panel. Some countries are missing data for 2015.

Prospects for additional tax revenue collection

Notwithstanding the increase in tax capacity and the improvements in the efficiency of tax revenue collection of over the past two decades or so, the average tax capacity in sub-Saharan Africa remains the lowest in the world at 20 percent. There is scope to increase it further. However, this objective will likely be a medium- to long-term one as tax capacity is largely determined by structural factors, which take time to address.

In contrast, efficiency in revenue mobilization is largely determined by governance. As such, the scope for policy action to boost further tax collection through improved efficiency is more achievable in the near term. As shown in the Figure 8, sub-Saharan Africa has the lowest scores in governance, as measured by both corruption and accountability in the International Country Risk Guide. Improving governance can reduce inefficiencies and help close the 4-percentage point of GDP gap between current tax levels and tax capacity in the region. As discussed earlier, at the projected nominal GDP levels for the region,[11] this gap corresponds to about $110 billion dollars annually or almost one half of the average $230 billion in investment financing gap over the next five years.

Figure 8: Average governance scores by region

CONCLUSION AND POLICY OPTIONS

The run-up in debt levels across Africa along with increasing concerns about debt sustainably is a reminder that financing for Africa's economic development remains a work in progress. In this brief, we assessed the state of play on tax revenue mobilization—the most important and sustainable source of development financing.

The increase in tax revenue as percent of GDP over the past two decades or so is a welcome development, although current levels remain lower than desired (and attainable) levels. To assess the prospects for mobilizing additional tax revenues, we focus on three fundamental questions: What factors account for the recent increase tax revenues? How do the current levels of tax revenues compare to the tax capacity of African economies? What policies can the countries in the region pursue to raise additional revenues?

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11 The projections are based on the International Monetary Fund's World Economic Outlook (April 2018).

The results from our analysis indicate that increases in tax capacity as well as in efficiency of tax collection contributed to the recent increase in tax revenues. Despite these improvements, tax revenues remain low compared to those of the OECD and other regions. To bridge the gap between African and OECD countries, improvements in both tax capacity and efficiency are necessary. Improving efficiency to the ideal level of close to 1 can raise revenues by 3.9 percent of GDP, bringing them close to the capacity of 20 percent. Reaching 24 percent of GDP would require that the region raise its tax capacity by 4-percentage points of GDP. On the policies to raise tax revenues, we see two sets policy options, which are not mutually exclusive:

- **Policies to raise taxation capacity:** The tax capacity is largely determined by structural factors, notably the large size of the informal sector, the low-level of taxable income, the dominance of the agricultural sector, and so on. Policies to foster strong and equitably economic growth, diversify economic activity away from agriculture, and reduce informality will help broaden the tax base and expand the taxation capacity of the economy. The structural nature of these factors suggests that they will likely remain medium- to long-term objectives.

- **Policies to raise efficiency in tax collection:** In contrast, closing the gap between current tax revenues and tax capacity is attainable in the near term. Despite increases in tax collection efforts across sub-Saharan Africa, there remains a significant gap—roughly 4 percentage point of GDP on average—between the region's current tax revenue and its tax capacity. There is scope to close this gap by improving governance. The region performs poorly on both corruption and democratic accountability indicators, with the lowest average scores in the world. We estimate the revenue gap could close if the region's corruption and democratic accountability scores are move up to the global median, which is still below those of the OECD countries. Strengthening public financial management including enhancing efficiency and equity of public spending will help. Citizens are more likely to comply with tax collection when they trust that their tax revenues are well managed (Barone and Mocetti, 2011).

- **Leverage technology:** The advent of information and communication technologies offer avenues to support tax revenues mobilization efforts. For example, digitization presents an opportunity to formalize informal businesses, expand the tax base, and increase the tax capacity. Typical interventions include the provision of financial services, credit access, entrepreneurship training, and business support services (Grimm, 2016). Simplifying processes and reducing the cost of formalization can help firms make the transition to the formal sector. Similarly, technology can be leveraged to enhance the efficiency of tax collection by modernizing and streamlining tax collection processes, reducing compliance costs, enforcing collection, sealing leakages, and so on. Encouragingly, several countries, including Ethiopia, Liberia, and Rwanda have moved in that direction by adopting electronic platforms for filling, reporting, or paying taxes.

Happily, it is not a choice between policies to raise tax capacity on the one hand or to enhance revenue collection on the other. Policies to boost tax capacity can occur in tandem with efforts to enhance tax collection efficiency, providing both near-term and medium- to long-term options to raise tax revenues to optimal levels. With the external financing environment likely to deteriorate further as global interest rates and debt levels rise, and as commitments to development assistance dwindle, raising domestic resources to finance sustainably development agendas is more imperative than ever.

TECHNICAL APPENDIX

Methodology

To understand whether sub-Saharan Africa's low tax revenues are due to low tax capacity or inefficiencies in tax administration, we model tax capacity using the stochastic frontier analysis (SFA) method. Aigner et al. (1977) first introduced SFA and the standard model is shown in equation (2). The model in equation (2) is adopted from the production function, which is linear in logs, shown in equation (1). SFA models have been extended several times to accommodate different distributional assumptions and to incorporate time-varying features of panel data. We use the time-varying panel-data model with observable heterogeneity introduced by Battese and Coelli (1995) for our tax capacity analysis. Observable heterogeneity refers to variables that do not directly affect the tax capacity of a country but could affect efficiency through variables z_{it}.

$$y = f(X_i; \beta) \, \xi_{it} . e v_{it} \qquad\qquad (1)$$

$$Y_{it} = \alpha + \beta' X_{it} + v_{it} - u_{it} \quad \text{where } u_{it} = -\ln(\xi_{it}) \qquad (2)$$

$$v_{it} \sim N(0, \sigma^2_v) \qquad\qquad (2a)$$

$$u_{it} \sim N^+(\mu_{it}, \sigma^2_u) \qquad \mu_{it} = \mu_0 + \delta' z_{it} \qquad\qquad (2b)$$

Y_{it} - Log of tax to GDP ratio for country i at time t

$u_{it} > 0$, represents the inefficiency in tax collection

v_{it} – random error term that captures omitted variable bias and measurement errors.

β - A vector of unknown parameters

X_{it} – A vector of variables that affect tax capacity in country i at time t

The stochastic frontier and inefficiency models are estimated simultaneously using maximum likelihood to avoid bias in the estimates of effort (Wang and Schmidt, 2002). The stochastic frontier model is conditional on v_{it} being normally distributed and independent of the inefficiency term u_{it}, which is strictly positive. The estimates of effort are produced using a formula proposed by Jondrow et al. (1982) which splits the composite error term $v_{it} - u_{it}$ into its random shock v_{it} and inefficiency component u_{it}. In SFA, tax effort is bounded by (0, 1], when effort is one, u_{it} is zero and the country is collecting maximum possible revenues represented by $Y_{it} = \alpha + \beta' X_{it} + v_{it}$.[12]

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[12] A more detailed discussion of the stochastic frontier model and its application to tax capacity is provided in Pessino and Fenochietto (2010). A discussion on modelling time-invariant heterogeneity is included in Langford and Ohlenberg (2016).

APPENDIX: DATA SOURCES

Variable	Source
Tax Revenues (% of GDP)[1]	ICTD/UNU-WIDER Government Revenue Dataset
GDP per capita, PPP (2011 $)	World Economic Outlook
Nominal Non-oil GDP (current local currency)	World Economic Outlook
Agriculture value added (% GDP)	World Development Indicators
Trade (% GDP)	World Development Indicators
Natural resource rents (% GDP)[2]	World Development Indicators
Education Index	United Nations
Shadow economy	Medina and Schneider (2018)
Inflation[3]	World Development Indicators
Corruption[4]	International Country Risk Guide/World Governance Indicators
Democratic Accountability[4]	International Country Risk Guide/World Governance Indicators

1 – To maximize coverage we also use all taxes excluding social contributions for Ghana and Mali. For Nigeria during 2010-15, we use all non-resource revenues; the difference between all non-resource revenues and non-resource taxes is less than 0.5 percent for most years when data is available for both.

2 - We take log (1+x) for these variables because of observations with zero values.

3 – We truncate inflation to exclude the top 1 percent and the lowest observation due to extreme values.

4 – For sub-Saharan African countries where ICRG data is not available, we impute scores by taking the average of the ICRG scores for the five countries ranked above and below based on the World Governance Indicators corruption and voice and accountability measure.

Table A1: Stochastic frontier econometric model results

	(I)	(II)	(III)	(IV)[1]	(V)[2]	(VI)[3]	(VII)
Constant	2.60***	3.67***	2.44***	1.70***	1.61***	3.77***	2.01***
Capacity							
Ln (GDP per capita)	0.09***		0.03***	0.14***	0.15***	0.01	-0.05***
Ln (Extractive Rents)	-0.09***	-0.10***	-0.07***	0.01	-0.02***	-0.14***	-0.09***
Ln (Trade)	0.07***	0.07***	0.13***	0.08***	0.09***	0.30***	0.04***
Ln (Shadow Economy)	-0.15***	-0.22***	-0.09***	-0.08***	-0.08***	-0.55***	-0.15***
Inflation	0.002***	-0.003***	-0.003***	-0.002***	-0.002***	-0.006***	-0.002***
Ln (Agriculture)		-0.02***					
Gov. Dummy (General = 1)			0.29***				
Ln (Education Index)							0.47***
Observations	2872	2591	2872	2471	2802	761	2803
Mean efficiency	0.72	0.74	0.74	0.75	0.74	0.80	0.74
Efficiency							
Constant	5.85***	3.47***	6.29***	1.27***	7.03***	6.65***	6.10***
Ln (Corruption)	-2.86***	-0.74***	-3.36***	-0.16***	-5.72*	-3.94***	-3.62***
Ln (Democratic Accountability)	-8.77***	-3.09***	-8.61***	-0.61***	-13.14**	-4.02***	-8.79***
Lambda	9.64***	4.16***	9.05***	1.55***	12.98***	3.39***	9.85***

Notes: The dependent variable is the log of the tax to GDP ratio. *** indicates significance at the 1 percent level, ** at the 5 percent level and * at the 10 percent level. The top 1 percent and the lowest inflation observations are dropped. 1) Excludes oil-dependent countries; 2) Tax to GDP ratio adjusted on non-oil GDP for oil-dependent countries; 3) Only sub-Saharan African countries included.

The tax capacity literature starting with Lotz and Morss (1967) has consistently found GDP per capita, agriculture value added as a percent of GDP, and trade as a percent of GDP to be important determinants. We test these and other variables such as size of the informal sector, natural resource rents, and education spending.

In line with previous studies, we find GDP per capita (Gupta, 2007), trade as a percent of GDP (Ghura, 1998), and inflation (Cyan et al., 2013) to be significant determinants of tax capacity. We find agriculture value added as a share of GDP to be insignificant when included alongside GDP per capita. This result differs from recent literature (Cyan et al., 2013; Fenochietto and Pessino, 2013). A likely reason is the strong negative correlation between GDP per capita and agriculture value added. Dropping GDP per capita from the model, we find the expected negative and significant between agriculture value added and tax capacity (Table A1, Column II)

Expecting that countries with large natural resource sectors would have lower non-resource revenues, we include the World Bank's natural resource rents indicator as a control. As expected, the variable is negative

and significant. When oil-dependent countries are dropped from the sample (Table A1, column IV), it is no longer significant. We also include estimate of the informal economy (Medina and Schneider, 2018) in our model expecting a negative effect on tax capacity. While most countries adjust their GDP data to capture the size of the informal sector, by definition it falls outside the tax system. Our results are as expected and in line with the literature where these variables have been included sporadically (Davoodi and Grigorian, 2007; Le et al., 2012).

Governance variables have been used in both regression (Le et al., 2008; Bird and Vazquez, 2008) and SFA models (Cyan et al., 2013; Langford and Ohlenberg, 2016) although with differing interpretations. In regression models, they enter as determinants of tax capacity whereas SFA models include them to explain effort. We include them to explain tax effort across countries and our results are in line with the literature with higher levels of corruption and lower levels of democratic accountability negatively affecting tax effort.

Data limitations have usually required the inclusion of a dummy variable to distinguish between central and general government revenues (Langford and Ohlenburg, 2016; Fenochietto and Pessino, 2013). However, we do not include one in our baseline specifications as the 'Government Revenue Dataset' we use notes that central government revenue is used in the merged dataset "if, and only if there is evidence that subnational revenue collection is limited". Regardless we test for its inclusion (Table A1, column III), finding that while the model effort is relatively stable, the coefficients on most variables included previously are smaller but still significant.

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